Prevalence of *Salmonella* in Slaughter Pigs in South Korea

Byeong Yeal Jung[1], Woo Won Lee[2], Hee Soo Lee[1], Ok Kyung Kim[1], Bong Hwan Kim[3]

1: National Veterinary Research & Quarantine Service, Bacteriology Division, Anyang 430-016, South Korea, 2: Pusan Public Health & Environment Institute, Pusan, South Korea, 3: College of Vet. Medicine, Kyungpook National University, Taegu 702-701, South Korea, Phone: +82-53-950-5972, Fax: +82-53-950-5972, E-mail: bhkim@knu.ac.kr

Abstract: A total of 177(11.9 %) *Salmonella* was isolated from 1,483 slaughtered pig samples(784 lymph nodes and 699 caecal contents) in Korea. One hundred forty(17.9 %) and 37(5.3 %) *Salmonella* were isolated from lymph nodes and caecal contents, respectively. The major serotypes were as follows; *S.* Typhimurium(28.2 %), *S.* Derby(17.5 %), *S.* Schwarzengrund(15.3 %) and *S.* Mbandaka(11.9 %). None of the 50 *S.* Typhimurium isolates were detected the ampicillin or chloramphenicol resistance genes in multipex PCR.

Keywords: *S.* Typhimurium, serotype, DT 104, lymph nodes, caecal contents

Introduction: Salmonellae have long been recognized as an important food-borne pathogen associated with the consumption of foods of animal origin. Swine can carry *Salmonella* in both the intestinal tract and the lymph nodes. In many countries, efforts are now being made to reduce the incidence of *Salmonella* carriage and to identify contamination sources at the farm.
The aim of this study was to determine the prevalence of *Salmonella* in the ileocecal lymph nodes and caecal contents of slaughter pigs as well as the population of *S.*Typhimurium definitive type 104(DT 104) from the isolates by using multiplex polymerase chain reaction(PCR).

Materials and Methods: During the period of December 2000 to March 2001, 784 ileocecal lymph nodes and 699 caecal contents of slaughter pigs were collected at abattoirs. Five g of lymph nodes were submerged in boiling water for 10 s to decontaminate the surface. And then they were macerated with 45 ml buffered peptone water (BPW) and incubated at 37 □ for 18 - 24 h. Aliquots of 0.1 ml of BPW were transferred to 10 ml of Rappaport Vassiliadis broth and incubated at 42 □ for 18 – 24 h. Portions of 5 g of caecal contents were gently stirred with 45 ml BPW and incubated at 37 □ for 18 - 24 h. One ml of BPW were transferred to 9 ml of Selenite Cysteine broth and incubated at 37 □ for 18 – 24 h. One loop of enrichment broth was streaked onto the surface of XLD agar and SS agar plates and then incubated at 37 □ for 18 – 24 h. A total of five suspect colonies were

examined with biochemical tests. Comfirmed *Salmonella* isolates were serotyped using Salmonella O and H antisera. Additionally, *S.* Typhimurium isolates were examined using multiplex PCR for the rapid presumptive diagnosis of *S.* Typhimurium DT104 (Kim, 2000).

Results: Results are shown in Table 1.

Table 1. Distribution of serotypes of *Salmonella* isolated from slaughter age pigs

Serotypes	No. (%) of *Salmonella* isolated from		Total (n=1,483)
	lymph nodes (n=784)	caecal contents (n=699)	
Typhimurium	41	9	50
Derby	20	11	31
Schwarzengrund	23	4	27
Mbandaka	19	2	21
Enteritidis	6	0	6
Agona	6	0	6
Braenderup	3	3	6
Newport	4	0	4
Ruiru	4	0	4
Rissen	3	1	4
Bredeney	0	3	3
Litchfield	2	0	2
Tennessee	1	1	2
Kinshasa	2	0	2
Eimsbuettel	2	0	2
Havana	1	0	1
Langensalza	0	1	1
Cubana	0	1	1
Untypable	3	1	4
Total	140	37	177

Salmonella spp. were detected in 17.9 %(140/784) of ileocecal lymph nodes and 5.3 %(37/699) of caecal contents in slaughter pigs. Table 1 presents the frequency of serotypes identified among the 140 and 37 *Salmonella* isolated from lymph nodes and caecal contents, respectively. From the 1,483 samples, 177 *Salmonella* were serotyped and belonged to 18 serotypes. The major serotypes were as follows; 50(28.2 %) *S.* Typhimurium, 31(17.5 %) *S.* Derby, 27(15.3 %) *S.* Schwarzengrund and 21(11.9 %) *S.* Mbandaka. A total of 50 isolates of *S.* Typhimurium were not detected the ampicillin or chloramphenicol resistance genes in multipex PCR.

Discussion and Conclusions: Although the prevalence of *Salmonella* in slaughter pigs may not accurately predict the prevalence of the other sample on individual farm, it may be possible to infer the prevalence of *Salmonella* among the farms. A previous study conducted in Korea identified 85(23.1 %) of the 367 ileocecal lymph nodes of slaughter pigs as positive for *Salmonella*(Kim, 1999). In an American study, 50 % of mesenteric lymph nodes collected from pig carcasses were positive for *Salmonella*(Keteran et al., 1982). This study demonstrated that the prevalence of *Salmonella* in ileocecal lymph node(17.9 %) was higher than that in caecal contents(5.3 %) of slaughter pigs. *S.* Typhimurium DT 104 have been emerged as an important cause of salmonellosis in many countries (Threlfall et al., 1996, Besser et al., 1997). There has been one report confirming the recovery of DT 104 in Korea (Yang et al., 2001) but DT 104 was not observed in this study. Although *S.* Enteritidis and *S.* Typhimurium are the most frequent food-poisoning bacteria, *S.* Enteritidis was found only 3.4 %(6/177) in this study. However, *S.* Typhimurium was the most dominant serotype isolated from pigs in Korea and could be of alarming significance in public health.

References

Besser, T.E., Gay, C.C., Gay, J.M., Hancock, D.D., Rice, D., Pritchett, L.C. and Erickson, E.D., 1997. Salmonellosis associated with *S.* Typhimurium DT 104 in the USA. Vet. Rec., 140:75.

Keteran, K., Brown, J. and Shotts, E.B., 1982. Salmonella in the mesenteric lymph nodes of healthy sow and hogs. Am. J. Vet. Res., 443:706-707.

Kim K.T., 1999. Serotypes and biochemical characteristics of *Salmonella* isolated from mesenteric lymph nodes of slaughter pigs. Thesis. Kyungpook National University.

Kim W.I., 2000. Detection of multiresistant *Salmonella typhimurium* DT 104 by multiplex PCR. Thesis. Kyungpook National University.

Threlfall, E.J., Frost, J.A., Ward, L.R. and Rowe, B., 1996. Increasing spectrum of resistance in multiresistant *Salmonella*. Lancet, 347:1052-1053.

Yang, S., Park, K., Seo, K., Besser, T.E., Yoo, H. and Park, Y., 2001. Multidrug resistant *Salmonella enterica* serovar *typhimurium* and *Salmonella enterica* serovar *enteritidis* identified by multiplex PCR from animals. 101st AmericanSsociety for Microbiology. A-73.